Sequence Listing

<110> Henry B. Lowman, Leonard G. Presta, Paula M. Jardieu, John Lowe

<120> Anti-IgE Antibodies and Method of Improving Polypeptides

<130> P1123R1

<140> US 09/109,207
<141> 1998-06-30

<150> US 60/051,554
<151> 1997-07-03

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gagctgctgc gcgattacgt aaagaagtta ttgaagcatc ctcgtcagta 300

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atagtcgctt tgttttttatt ttttaatgta tttgtaacta gaattcgagc 400

tcggtacccg gggatcctct cgaggttgag gtgattttat gaaaaagaat 450

atcgcatttc ttcttgcatc tatgttcgtt ttttctattg ctacaaacgc 500

gtacgctgat atccagctga cccagtcccc gagctccctg tccgcctctg 550

tgggcgatag ggtcaccatc acctgccgtg ccagtcagag cgtcgattac 600

gaaggtgata gctacctgaa ctggtatcaa cagaaaccag gaaaagctcc 650

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1

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accctgacgc tgagcaaagc agactacgag aaacacaaag tctacgcctg 1100

cgaagtcacc catcagggcc tgagctcgcc cgtcacaaag agcttcaaca 1150

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acgcaagttc acgtaaaaag ggtatctaga ggttgaggtg attttatgaa 1250

aaagaatatc gcatttcttc ttgcatctat gttcgttttt tctattgcta 1300

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3

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<212> PRT
<213> Mus musculus

<400> 2

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                 20                  25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Phe Pro Gly Asn Lys
                     35                  40                  45

Leu Glu Trp Met Gly Ser Ile Thr Tyr Asp Gly Ser Ser Asn Tyr
                     50                  55                  60

Asn Pro Ser Leu Lys Asn Arg Ile Ser Val Thr Arg Asp Thr Ser
                     65                  70                  75

Gln Asn Gln Phe Phe Leu Lys Leu Asn Ser Ala Thr Ala Glu Asp
                     80                  85                  90

Thr Ala Thr Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                     95                 100                 105

Trp His Phe Ala Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser
                    110                 115                 120

Ser
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<213> Artificial
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5

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                20                  25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35                  40                  45

Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                50                  55                  60

Ala Asp Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser
                65                  70                  75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80                  85                  90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                95                  100                 105

Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                110                 115                 120

Ser

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<212> PRT
<213> Homo sapiens

<220>
<221> unsure
<222> 30, 104-108
<223> unknown amino acid

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 1               5                   10                  15

Gly Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Xaa
                20                  25                  30

Ser Asp Tyr Ala Met Ser Trp Val Arg Gln Ala Pro Gly Lys Gly
                35                  40                  45

Leu Glu Trp Val Ala Val Ile Ser Asn Gly Ser Asp Thr Tyr Tyr
                50                  55                  60

Ala Asp Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asp Ser
                65                  70                  75

Lys Asn Thr Leu Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80                  85                  90

6

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Ser Arg Phe Phe Xaa Xaa
                  95              100              105

Xaa Xaa Xaa Asp Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
              110              115              120

Ser

<210> 5
<211> 111
<212> PRT
<213> Mus musculus

<400> 5
Asp Ile Gln Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu
  1               5              10                  15

Gly Gln Arg Ala Thr Ile Ser Cys Lys Ala Ser Gln Ser Val Asp
                 20              25                  30

Tyr Asp Gly Asp Ser Tyr Met Asn Trp Tyr Gln Gln Lys Pro Gly
                 35              40                  45

Gln Pro Pro Ile Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Gly Ser
                 50              55                  60

Glu Ile Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                 65              70                  75

Thr Leu Asn Ile His Pro Val Glu Glu Glu Asp Ala Ala Thr Phe
                 80              85                  90

Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Ala Gly
                 95              100              105

Thr Lys Leu Glu Ile Lys
                 110

<210> 6
<211> 111
<212> PRT
<213> Artificial

<220>
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<222> 1-111
<223> F(ab) light chain sequence derived from MAE11

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Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
  1               5              10                  15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Val Asp
                 20              25                  30

Tyr Asp Gly Asp Ser Tyr Met Asn Trp Tyr Gln Gln Lys Pro Gly
                 35              40                  45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                 50              55                  60

```
             Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                          65              70              75

  5          Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                          80              85              90

             Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                          95              100             105
 10
             Thr Lys Val Glu Ile Lys
                          110


             <210> 7
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             <212> PRT
             <213> Homo sapiens


             <220>
 20          <221> unsure
             <222> 33-34
             <223> unknown amino acid


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                 1               5               10              15

              Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Val Asp
                              20              25              30
 30
              Ile Ser Xaa Xaa Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
                              35              40              45

              Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Ser Leu Glu Ser
 35                           50              55              60

              Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                              65              70              75

 40           Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                              80              85              90

              Tyr Cys Gln Gln Tyr Asn Ser Leu Pro Tyr Thr Phe Gly Gln Gly
                              95              100             105
 45
              Thr Lys Val Glu Ile Lys
                              110


             <210> 8
 50          <211> 114
             <212> PRT
             <213> Artificial


             <220>
 55          <221> Artificial
             <222> 1-114
             <223> Light chain sequence derived from MAE11


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 60           Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
                 1               5               10              15
```

8

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          Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val Asp
                        20                  25                  30

          Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
 5                          35                  40                  45

          Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                        50                  55                  60

10        Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                        65                  70                  75

          Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                        80                  85                  90
15
          Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                        95                 100                 105

          Thr Lys Val Glu Ile Lys Arg Thr Val
20                       110

     <210> 9
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     <212> PRT
25   <213> Artificial

     <220>
     <221> Artificial
     <222> 1-114
30   <223> Light chain sequence derived from MAE11

     <400> 9
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            1               5                  10                  15
35
          Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Val Asp
                        20                  25                  30

          Tyr Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
40                          35                  40                  45

          Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                        50                  55                  60

45        Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                        65                  70                  75

          Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                        80                  85                  90
50
          Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                        95                 100                 105

          Thr Lys Val Glu Ile Lys Arg Thr Val
55                       110

     <210> 10
     <211> 114
     <212> PRT
60   <213> Artificial

     <220>
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9

<221> Artificial
<222> 1-114
<223> Light chain sequence derived from MAE11

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 1               5               10                  15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Val Asp
                20              25                  30

Tyr Asp Gly Asp Ser Tyr Met Asn Trp Tyr Gln Gln Lys Pro Gly
                35              40                  45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                50              55                  60

Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                65              70                  75

Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                80              85                  90

Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                95              100                 105

Thr Lys Val Glu Ile Lys Arg Thr Val
                110
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<210> 11
<211> 114
<212> PRT
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<220>
<221> Artificial
<222> 1-114
<223> Heavy chain sequence derived from MAE11

<400> 11
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Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
 1               5               10                  15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                20              25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35              40                  45

Leu Glu Trp Val Ala Ser Ile Lys Tyr Ser Gly Glu Thr Lys Tyr
                50              55                  60

Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                65              70                  75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80              85                  90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                95              100                 105

Trp His Phe Ala Val Trp Gly Gln Gly
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<212> PRT
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<221> Artificial
<222> 1-114
<223> Heavy chain sequence derived from MAE11

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Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
 1               5                  10                  15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                20              25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35              40                  45

Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                50              55                  60

Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                65              70                  75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80              85                  90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                95              100                 105

Trp His Phe Ala Val Trp Gly Gln Gly
                110
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<210> 13
<211> 218
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-218
<223> Light chain sequence derived from MAE11

<400> 13
Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
 1               5                  10                  15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Val Asp
                20              25                  30

Tyr Asp Gly Asp Ser Tyr Met Asn Trp Tyr Gln Gln Lys Pro Gly
                35              40                  45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                50              55                  60

Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                65              70                  75
```

```
        Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                    80                  85                  90

 5      Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                    95                 100                 105

        Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe
                   110                 115                 120
10
        Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser
                   125                 130                 135

        Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val
15                 140                 145                 150

        Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu
                   155                 160                 165

20      Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
                   170                 175                 180

        Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val
                   185                 190                 195
25
        Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
                   200                 205                 210

        Lys Ser Phe Asn Arg Gly Glu Cys
30                 215

        <210> 14
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        <212> PRT
35      <213> Artificial

        <220>
        <221> Artificial
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40      <223> Heavy chain sequence derived from MAE11

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          1               5                  10                  15
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        Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                    20                  25                  30

        Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
50                  35                  40                  45

        Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                    50                  55                  60

55      Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                    65                  70                  75

        Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                    80                  85                  90
60
        Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                    95                 100                 105
```

12

```
        Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                        110             115                 120
 5      Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                        125             130                 135
        Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
                        140             145                 150
10      Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                        155             160                 165
        Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
15                      170             175                 180
        Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                        185             190                 195
20      Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                        200             205                 210
        Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                        215             220                 225
25      Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly
                        230             235                 240
        Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu
30                      245             250                 255
        Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
                        260             265                 270
35      Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly
                        275             280                 285
        Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr
                        290             295                 300
40      Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln
                        305             310                 315
        Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys
45                      320             325                 330
        Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
                        335             340                 345
50      Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Glu
                        350             355                 360
        Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
55                      365             370                 375
        Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
                        380             385                 390
60      Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp
                        395             400                 405
        Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg
```

13

```
                    410                   415                   420
     Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
                    425                   430                   435
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5

```
     Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                    440                   445                   450
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```
     Lys
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10

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<210> 15
<211> 218
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15
```
<213> Artificial
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<220>
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<222> 1-218
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<223> Light chain sequence derived from MAE11
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     Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
       1               5                  10                   15
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25
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     Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val Asp
                     20                  25                   30
```

```
     Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
```
30
```
                     35                  40                   45
```

```
     Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                     50                  55                   60
```

35
```
     Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                     65                  70                   75
```

```
     Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                     80                  85                   90
```
40

```
     Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                     95                 100                  105
```

```
     Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe
```
45
```
                    110                 115                  120
```

```
     Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser
                    125                 130                  135
```

50
```
     Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val
                    140                 145                  150
```

```
     Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu
                    155                 160                  165
```
55

```
     Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
                    170                 175                  180
```

```
     Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val
```
60
```
                    185                 190                  195
```

```
     Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
```

```
        Lys Ser Phe Asn Arg Gly Glu Cys
                        215
```

```
        Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
          1               5                  10                  15

        Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                        20                  25                  30

        Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                        35                  40                  45

        Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                        50                  55                  60

        Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                        65                  70                  75

        Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                        80                  85                  90

        Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                        95                  100                 105

        Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                        110                 115                 120

        Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                        125                 130                 135

        Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
                        140                 145                 150

        Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                        155                 160                 165

        Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
                        170                 175                 180

        Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                        185                 190                 195

        Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                        200                 205                 210

        Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                        215                 220                 225

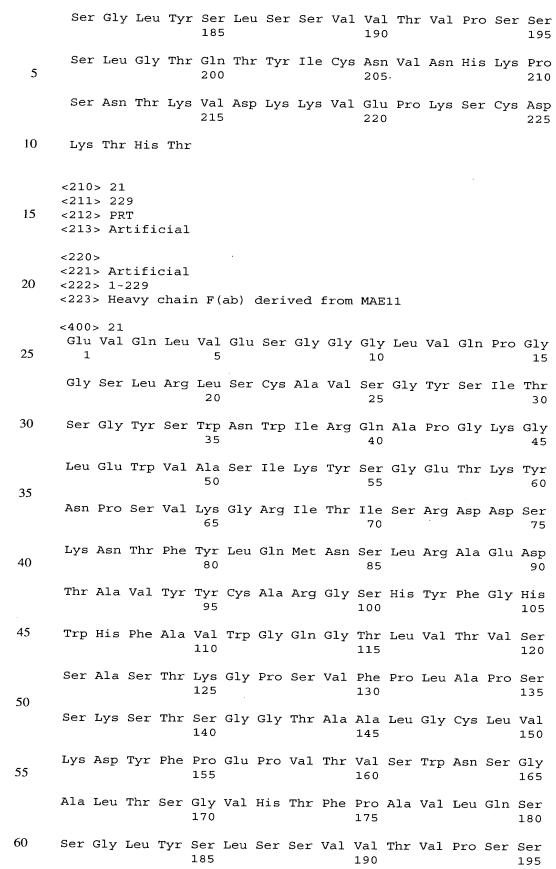        Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly
```

$\bullet$ $\bullet$

      230   235   240

Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu
                 245   250   255

5

Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
                 260   265   270

Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly
                 275   280   285

10

Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr
                 290   295   300

15

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln
                 305   310   315

Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys
                 320   325   330

20

Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
                 335   340   345

Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Glu
                 350   355   360

25

Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
                 365   370   375

30

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
                 380   385   390

Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp
                 395   400   405

35

Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg
                 410   415   420

Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
                 425   430   435

40

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                 440   445   450

45   Lys

<210> 17
<211> 218
50   <212> PRT
<213> Artificial

<220>
<221> Artificial
55   <222> 1-218
<223> Light chain sequence derived from MAE11

<400> 17
Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
60   1   5   10   15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val Asp

Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
                35   40   45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                50   55   60

Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                65   70   75

Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                80   85   90

Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                95   100   105

Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe
                110   115   120

Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser
                125   130   135

Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val
                140   145   150

Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu
                155   160   165

Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
                170   175   180

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val
                185   190   195

Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
                200   205   210

Lys Ser Phe Asn Arg Gly Glu Cys
                215

<210> 18
<211> 451
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-451
<223> Heavy chain sequence derived from MAE11

<400> 18
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
  1   5   10   15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                20   25   30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35   40   45

Leu Glu Trp Val Ala Ser Ile Lys Tyr Ser Gly Glu Thr Lys Tyr

17

```
         Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                         65              70              75
  5
         Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                         80              85              90

         Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
 10                      95              100             105

         Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                         110             115             120

 15      Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                         125             130             135

         Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
 20                      140             145             150

         Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                         155             160             165

         Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
 25                      170             175             180

         Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                         185             190             195

 30      Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                         200             205             210

         Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                         215             220             225
 35
         Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly
                         230             235             240

         Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu
 40                      245             250             255

         Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
                         260             265             270

 45      Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly
                         275             280             285

         Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr
                         290             295             300
 50
         Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln
                         305             310             315

         Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys
 55                      320             325             330

         Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
                         335             340             345

 60      Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Glu
                         350             355             360
```

18

```
Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
                365                 370                 375

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
                380                 385                 390

Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp
                395                 400                 405

Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg
                410                 415                 420

Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
                425                 430                 435

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                440                 445                 450

Lys
```

<210> 19
<211> 218
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-218
<223> Light chain F(ab) sequence derived from MAE11

<400> 19
```
Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
 1               5                   10                  15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val Asp
                20                  25                  30

Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
                35                  40                  45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
                50                  55                  60

Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                65                  70                  75

Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
                80                  85                  90

Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
                95                  100                 105

Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe
                110                 115                 120

Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser
                125                 130                 135

Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val
                140                 145                 150
```

19

```
              Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu
                              155             160             165

          Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
     5                        170             175             180

              Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val
                              185             190             195

    10    Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
                              200             205             210

              Lys Ser Phe Asn Arg Gly Glu Cys
                              215

    15
          <210> 20
          <211> 229
          <212> PRT
          <213> Artificial

    20
          <220>
          <221> Artificial
          <222> 1-229
          <223> Heavy chain F(ab) sequence derived from MAE11

    25
          <400> 20
              Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
                1               5               10                  15

    30    Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                              20              25                  30

              Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                              35              40                  45

    35
              Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                              50              55                  60

              Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
    40                        65              70                  75

              Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                              80              85                  90

    45    Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                              95              100                 105

              Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                              110             115                 120

    50
              Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                              125             130                 135

              Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
    55                        140             145                 150

              Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                              155             160                 165

    60    Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
                              170             175                 180
```

Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                185   190   195

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                200   205.   210

Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                215   220   225

Lys Thr His Thr

<210> 21
<211> 229
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-229
<223> Heavy chain F(ab) derived from MAE11

<400> 21
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
  1   5   10   15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                20   25   30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35   40   45

Leu Glu Trp Val Ala Ser Ile Lys Tyr Ser Gly Glu Thr Lys Tyr
                50   55   60

Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                65   70   75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80   85   90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                95   100   105

Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                110   115   120

Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                125   130   135

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
                140   145   150

Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                155   160   165

Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
                170   175   180

Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                185   190   195

21

```
Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
              200             205                 210

Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
              215             220                 225

Lys Thr His Thr


<210> 22
<211> 248
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-248
<223> sFv sequence derived from MAE11

<400> 22
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
  1               5                 10                  15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
              20              25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
              35              40                  45

Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
              50              55                  60

Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
              65              70                  75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
              80              85                  90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
              95              100                 105

Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
              110             115                 120

Ser Glu Gly Gly Gly Ser Glu Gly Gly Gly Ser Glu Gly Gly Gly
              125             130                 135

Ser Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser
              140             145                 150
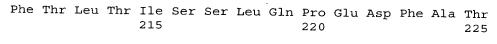
Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val
              155             160                 165

Asp Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro
              170             175                 180

Gly Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu
              185             190                 195

Ser Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp
              200             205                 210
```

22

```
        Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr
                          215               220               225

 5      Tyr Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln
                          230               235               240

        Gly Thr Lys Val Glu Ile Lys Arg
                          245

10      <210> 23
        <211> 248
        <212> PRT
        <213> Artificial

15      <220>
        <221> Artificial
        <222> 1-248
        <223> sFv sequence derived from MAE11

20      <400> 23
        Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
            1               5               10               15

        Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
25                        20               25               30

        Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                          35               40               45

30      Leu Glu Trp Val Ala Ser Ile Lys Tyr Ser Gly Glu Thr Lys Tyr
                          50               55               60

        Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                          65               70               75
35
        Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                          80               85               90

        Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
40                        95               100              105

        Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                          110              115              120

45      Ser Glu Gly Gly Gly Ser Glu Gly Gly Gly Ser Glu Gly Gly Gly
                          125              130              135

        Ser Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser
                          140              145              150
50
        Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val
                          155              160              165

        Asp Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro
55                        170              175              180

        Gly Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu
                          185              190              195

60      Ser Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp
                          200              205              210
```

23

Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr
215 220 225

Tyr Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln
230 235 240

Gly Thr Lys Val Glu Ile Lys Arg
245

<210> 24
<211> 218
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-218
<223> Light chain F(ab)'2 sequence derived from MAE11

<400> 24
Asp Ile Gln Leu Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val
1 5 10 15

Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Lys Pro Val Asp
20 25 30

Gly Glu Gly Asp Ser Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Gly
35 40 45

Lys Ala Pro Lys Leu Leu Ile Tyr Ala Ala Ser Tyr Leu Glu Ser
50 55 60

Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
65 70 75

Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Phe Ala Thr Tyr
80 85 90

Tyr Cys Gln Gln Ser His Glu Asp Pro Tyr Thr Phe Gly Gln Gly
95 100 105

Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe
110 115 120

Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser
125 130 135

Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val
140 145 150

Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu
155 160 165

Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
170 175 180

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val
185 190 195

Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
200 205 210

24

```
        Lys Ser Phe Asn Arg Gly Glu Cys
                        215


        <210> 25
        <211> 233
        <212> PRT
        <213> Artificial


        <220>
        <221> Artificial sequence
        <222> 1-233
        <223> Heavy chain F(ab)'2 sequence derived from MAE11


        <400> 25
         Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
           1               5              10                   15

         Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                        20              25                   30

         Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                        35              40                   45

         Leu Glu Trp Val Ala Ser Ile Thr Tyr Asp Gly Ser Thr Asn Tyr
                        50              55                   60

         Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                        65              70                   75

         Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                        80              85                   90

         Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                        95              100                  105

         Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                        110             115                  120

         Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                        125             130                  135

         Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
                        140             145                  150

         Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                        155             160                  165

         Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
                        170             175                  180

         Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                        185             190                  195

         Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                        200             205                  210

         Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                        215             220                  225

     Lys Thr His Thr Cys Pro Pro Cys
                        230



                                 25
```

<210> 26
<211> 233
<212> PRT
<213> Artificial

<220>
<221> Artificial
<222> 1-233
<223> Heavy chain F(ab)'2 sequence derived from MAE11

<400> 26

```
Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly
 1               5                  10                  15

Gly Ser Leu Arg Leu Ser Cys Ala Val Ser Gly Tyr Ser Ile Thr
                20                  25                  30

Ser Gly Tyr Ser Trp Asn Trp Ile Arg Gln Ala Pro Gly Lys Gly
                35                  40                  45

Leu Glu Trp Val Ala Ser Ile Lys Tyr Ser Gly Glu Thr Lys Tyr
                50                  55                  60

Asn Pro Ser Val Lys Gly Arg Ile Thr Ile Ser Arg Asp Asp Ser
                65                  70                  75

Lys Asn Thr Phe Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp
                80                  85                  90

Thr Ala Val Tyr Tyr Cys Ala Arg Gly Ser His Tyr Phe Gly His
                95                  100                 105

Trp His Phe Ala Val Trp Gly Gln Gly Thr Leu Val Thr Val Ser
                110                 115                 120

Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                125                 130                 135

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
                140                 145                 150

Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
                155                 160                 165

Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser
                170                 175                 180

Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
                185                 190                 195

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
                200                 205                 210

Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp
                215                 220                 225

Lys Thr His Thr Cys Pro Pro Cys
                230
```

<210> 27
<211> 45
<212> DNA

<210> Artificial

<220>
<221> Artificial
<222> 1-45
<223> Stop-Template Oligos for First-Round Mutagenesis

<400> 27
acctgccgtg ccagttaata agtctaataa gaaggtgata gctac 45

<210> 28
<211> 46
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-46
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 28
gccagtcaga gcgtctaata ataaggttga agctacctga actggt 46

<210> 29
<211> 50
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-50
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 29
tgtgctcgag gcagctaata ataaggttaa tggtaattcg ccgtgtgggg 50

<210> 30
<211> 43
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-43
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 30
gaaactactg atttactaat aataataact ggagtctgga gtc 43

<210> 31
<211> 53
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-53
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 31
cttattactg tcagcaaagt taataataac cgtaaacatt tggacagggt 50

27

acc 53

<210> 32
<211> 46
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-46
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 32
  gtcctgtgca gtttcttaat aataataata atccggatac agctgg 46

<210> 33
<211> 45
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-45
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 33
  gcctactcca tcacctaata ataaagctga aactggatcc gtcag 45

<210> 34
<211> 53
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-53
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 34
  gggttgcatc gatttaataa taaggataaa cttaatataa ccctagcctc 50

  aag 53

<210> 35
<211> 48
<212> DNA
<213> Artificial

<220>
<221> Artificial
<222> 1-48
<223> Stop-Template Oligos For First-Round Mutagenesis

<400> 35
  aagccggtcg acaggtaata agattaatac taaaactggt atcaacag 48

<210> 36
<211> 45
<212> DNA
<213> Artificial

<220>

28

<221> Artificial
<222> 1-45
<223> Library-Specific, Degenerate Oligos For Second Round Mutagenesis

5 <220>
<221> unsure
<222> 16-17, 19-20, 25-26, 28-29
<223> unknown base

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